Residential Construction From a Long-Run Perspective

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Frank de Leeuw, formerly BEA's Chief Statistician, provided helpful comments on an earlier draft of this article.

MOST DISCUSSIONS about housing construction focus on the short run. That is to be expected, as homebuilding is a cyclically sensitive component of economic activity. Primarily, fluctuations in housing construction have been linked with financial conditions that accompany booms and recessions; specifically, fluctuations in housing construction have been linked with fluctuations in mortgage interest rates and, up to 1979, credit availability. Secondarily, cyclical variations in real disposable personal income and consumer confidence have figured in the timing of the demand for new housing. These aspects, together with the effects of substantial changes in Federal housing subsidies and of pertinent new tax legislation, dominate the current analysis of housing markets and construction activity.

This article examines residential construction from a long-run perspective. From this perspective, demographic factors play a dominant role. Ultimately, the size of the housing stock excluding second homes, in numbers of units, is determined by the number of households.[1] The number of households is, in turn, strongly linked to demographic factors, in particular, the size and age distribution of the adult population. Thus, the number of new units constructed is related to changes over time in these demographic factors—notably to the growth of the adult population. Both demographic and economic factors determine the exact relationship between the adult population and the number of households. Demographic factors—in particular, the age distribution of the adult population—also influence the mix of housing by type of structure.

The size and the quality of the housing units that are demanded are determined by economic factors—principally real disposable personal income and the cost of, and the expected investment return on, homeownership (or the expected net return on investment in rental housing)—and by the sizes of households. Economic factors are also important considerations in deciding whether to remodel a house or to sell it and buy another; hence, they affect the allocation of construction activity between new and existing units.

This article proceeds in stages as follows. The first section reviews demographic developments during the three decades from 1960 to 1990 by looking at both the changing growth rates of the total adult population and the contributions of age subgroups of this population to this pattern. The next section examines the relationship of population growth to net household formation and the changes in that relationship over time. The third section examines the relationship between net household formation and the number of new housing units constructed, as measured by housing starts, and the fourth, the relationship between the age composition of heads of households and the composition of housing starts by type of structure. The fifth section examines factors that determine the amount of real expenditures per new housing unit (with an emphasis on single-family structures). The next section briefly examines the allocation of purchases between new and existing structures. The article concludes by summing up the impact of the demographic and economic factors on total investment in residential structures in 1960–90 and by drawing some inferences about housing construction in the 1990's.

Because of the article's long-run focus, much of the analysis is in terms of 5-year intervals.[2] This approach smooths the impact of cyclical and other disturbances, thus facilitating the assessment of demographic influences on residential construction.

1. A household is an individual, a family, or any other group who regularly occupies a housing unit.

2. For population and households (which are stocks), the periods are from mid-1960 to mid-1965, mid-1965 to mid-1970, and so forth; for new housing units and expenditures, the corresponding periods are 1961–65, 1966–70, and so forth. In analyzing investment expenditures per new housing unit, a shorter time unit is used because of the apparently greater sensitivity of behavior to the underlying factors.

Demographic changes, 1960–90

The growth pattern of the U.S. adult population—persons 18 years and over—during 1960–90 was dominated by the post-World War II "baby boom" of 1946 to 1964. This boom produced an average annual growth surge of 2 percent in adult population during the 1970's; it was preceded and followed by a decade of more moderate growth—averaging 1½ percent annually in the 1960's and 1¼ percent in the 1980's.

The dynamics of the baby boom and other demographic factors can be seen in chart 1, which depicts half-decade changes in the adult population by age group. The earliest baby boomers reached adulthood in 1964, that is, just before the end of the first half-decade. During the next 5 years, many more crossed the threshold of young adulthood. (That increases in the 18-to-24-year-old age group were about the same in both half decades reflects the relatively small number of persons who turned 25 during the first period because of low birth rates during the Great Depression.) From 1970 to 1985, the baby boomers produced bulges in the growth of the 25-to-34-year-old age group, while the growth in the number of 18- to 24-year-olds decelerated sharply in the 1970's and then declined in 1980–85. In the 1980's, increases in adult population were centered in the 35-to-64-year-old age group, as many baby boomers turned 35. Aside from the dynamics of the baby boom, since the early 1970's, there has been a strong upward trend in the number of persons aged 65 and older; this growth reflects increased longevity.

Growth of adult population and net household formation

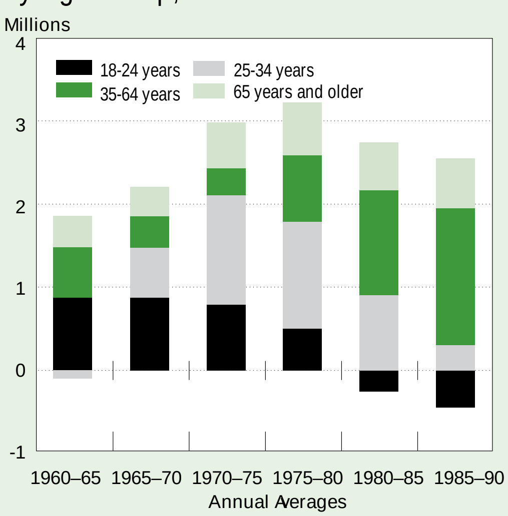
A priori, one might expect a reasonably stable relationship between the size of the adult population and the number of households. Indeed, the ratio of the number of households to adult population, often called the "headship rate," has historically remained within a fairly narrow range. From 1960 to 1990, this ratio gradually rose from 0.457 to 0.495. This relative stability permits approximate predictions of the number of households from population projections.[3] However, the *change* in the number of households—that is, net household formation or the number of newly formed households less the number of dissolutions of households—is the direct determinant of the demand for additional housing expressed in numbers of newly constructed housing units.

How reliably do changes in adult population predict net household formation? Chart 2 shows average annual changes in adult population and in households. Visually, the relationship between the two variables appears strong. Clearly, household formation in the 1960's and 1970's mirrors

3. See Leonard Mills, "Understanding National and Regional Housing Trends," *Business Review* (Philadelphia, PA: Federal Reserve Bank of Philadelphia, September-October 1991): 15–23.

CHART 1

Changes in Adult Population by Age Group, 1960–90

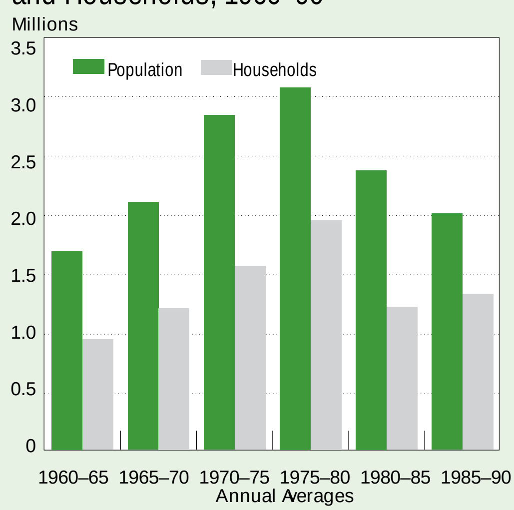


Data: Bureau of the Census

U.S. Department of Commerce, Bureau of Economic Analysis

CHART 2

Changes in Adult Population and Households, 1960–90



Data: Bureau of the Census

U.S. Department of Commerce, Bureau of Economic Analysis the steady acceleration of the adult population, and in the 1980's, net household formation recedes as does the population growth. However, a closer look at the data shows variability in the relationship, especially after 1975. In 1960–75, the overall incremental headship rate fluctuated (on the 5-year-average basis) within a narrow range, between 55 and 57 percent. However, in 1975–80, when the rate of increase in population substantially diminished, net household formation continued to advance unabatedly, which resulted in a rise in the incremental headship rate from 55 percent to 63 percent. The relationship was sharply reversed in 1980–85, when net household formation fell much more than the growth in population; as a result, the incremental headship rate dropped to 51 percent. The relationship again reversed in 1985–90, when net household formation increased while population growth continued to decrease—the only instance of an inverse pattern—which brought the incremental headship rate to an unprecedented 66 percent.

What accounts for this variability? To answer this question, it is useful to consider the age subgroups of the adult population (thus, stages of the life cycle) and the kinds of household configurations and choices that are peculiar to each subgroup. Young adults, aged 18 to 24 years, manifest a wide variety of living arrangements, only some of which result in increases in the number of households and then to a varying degree. They may continue to live with their parents; they may live in apartments, either alone or with other young adults; or they may live in rented rooms (usually in single-family structures) in already established households or in college dormitories.[4]

Adults aged 25 to 34 years generally live as single-person householders or as married couples, some with children. This is the age group that is most prominently faced with tenure choice, that is, the choice between (continued) rental and owner occupancy. The shift from rental to owner occupancy may or may not be accompanied by a change in the number of households: If two single-person householders marry and purchase a home, the number of households falls; if a couple moves from a rented unit to a purchased unit, the number of households does not change; and if a couple splits and the two individuals move into separate units, the number of households increases.

Persons aged 35 to 64 years generally live in single-family homes, with or without children. They may change tenure status or move to more expensive houses. The main factor tending to increase the number of households relative to population in this age group is the rising incidence of divorce, which usually results in the formation of another household.

Among persons aged 65 and older, a principal cause of a high and rising headship rate is increased longevity, which increases the proportion of single-spouse survivors. Furthermore, because the housing alternatives available to senior citizens have increased, living with middle-aged children—a factor tending to hold down the headship rate—occurs less frequently.

Table 1 shows, for the total adult population and for the four age groups, average annual changes (by half-decades) in population and in the number of households together with initial-level and incremental headship rates. As seen in the table, the (average and marginal) propensity to head households tends to increase as age increases, a tendency that is most marked between the 18-to-24-year-old and the 25-to-34-year-old age groups. One possible cause of variation in the incremental headship rate for the overall adult

Table 1.—Changes in Adult Population and Househoulds, Total and by Age Group, 1960–90

[Average annual change, millions]

	1960–65	1965–70	1970–75	1975–80	1980–85	1985–90
Total (18 years and over)						
Population	1.67	2.08	2.82	3.05	2.35	1.99
Households	.93	1.19	1.54	1.93	1.20	1.31
Headship rate:						
Initial [1]	.46	.46	.47	.48	.49	.50
Incremental [2]	.56	.57	.55	.63	.51	.66
18–24 years:						
Population	.83	.83	.75	.47	–.24	–.42
Households	.17	.19	.29	.15	–.23	–.06
Headship rate:						
Initial	.16	.17	.18	.21	.22	.19
Increment	.21	.23	.39	.31	.94	.15
25–34 years:						
Population	–.09	.57	1.24	1.22	.85	.29
Households	.04	.35	.65	.71	.30	.09
Headship rate:						
Initial	.43	.45	.47	48	.49	.48
Incremental	–.43	.62	.53	.58	.36	.31
35–64 years:						
Population	.58	.36	.31	.75	1.20	1.64
Households	.41	.34	.25	.62	.80	.88
Headship rate:						
Initial	.52	.52	.54	.54	.56	.57
Incremental	.71	.96	.80	.82	.67	.54
65 years and over:						
Population	.36	.33	.52	.60	.54	.56
Households	.31	.31	.35	.46	.32	.40
Headship rate:						
Initial	.57	.59	.62	.63	.64	.64
Incremental	.86	.93	.68	.76	.60	.71

1. Ratio of households to population in initial year.
2. Ratio of change in households to change in population.
Source: U.S. Department of Commerce, Bureau of Economic Analysis

4. Dormitory rooms are not counted as separate housing units; thus, dormitory tenants do not constitute households.

population is, therefore, the shifting age composition of the changes in adult population. During 1975–80, for instance, the combination of a relative increase in the population aged 35 to 64 years and a relative decrease in 18- to 24-year-olds largely accounts for the sharp rise in the overall incremental rate from the early 1970's.

A similar shift from the early to the late 1980's, due to a decrease in 18- to 24-year-olds was even more pronounced. Slower attrition of households headed by 18- to 24-year-olds relative to population in that age group and a recovery in the incremental headship rate in the 65-and-older subgroup reinforced the surge in the overall incremental headship rate during 1985–90.

Shifting age composition, however, is not the only or even the main cause of variability in the overall incremental headship rate. Indeed, variability in the incremental rate within age subgroups generally dominates the age composition effects; the latter, in fact, partly offset the effects of within-age-group variability.[5] Thus, during the early 1970's, a period marked by a major postwar recession, all age groups except the 18- to 24-year-olds displayed substantial decreases in incremental headship rates; (in the cases of the two groups aged 35 years and older, these decreases were from relatively high rates in the late 1960's). These decreases, however, were largely offset by the effect on household formation of the surge in the 25- to 34-year-olds and the higher incremental headship rate shown for the 18- to 24-year-olds, which moderated the decline in the overall incremental rate from the late 1960's.

The causes of the within-group variability are not easy to sort out. To some degree, the variability and large deviations of incremental rates from level rates reflect simply the differences in level headship rates between those persons just entering the age subgroup and those exiting from it. Aside from this and the upward drift in the level headship rates in all age subgroups—which, in part, reflects a rising proportion of single-person households resulting from increasing divorce rates—economic factors doubtless play a significant role. In particular, during recessions, younger persons, many of whom are on the margin of forming new households, may defer such decisions because of actual or threatened unemployment and continue to live with their parents or with unrelated persons longer than they might otherwise. In the 25-to-34-year-old age group, deferment of home purchases may postpone the dissolution of larger sized into smaller sized households.

Such behavior patterns are most clearly evident in the data in the early 1980's, a period marked by record-high mortgage rates as well as a major recession. The rise in the incremental rate for the 18- to 24-year-olds from 0.23 in the late 1960's to 0.39 in the early 1970's seems anomalous because the early 1970's also included a major recession. At any age, the affordability of housing in terms of the purchase or rental price and the cost and availability of mortgage credit can impinge upon household formation and dissolution decisions and, hence, upon headship rates.

Household formation and housing starts

Because households are by definition identified with occupied housing units, the net change in available housing units equals the net change in the number of households plus the change in the number of vacant units. The change in the number of available units equals completions of newly constructed units (including mobile home placements) plus net conversions (subdivisions less consolidations of units in existing structures plus net conversions from nonresidential to residential use) less removals.

Two points must be considered before this framework can be made useful for analyzing the relationship between net household formation and the number of housing starts. First, completions—not starts—of new housing units appear in the relationship; but for the reasons given below, it is starts that are used for the focus and the measure of newly constructed units in this article. Second, account must be taken of (or simplifying assumptions made about) the nonconstruction components of the supply of available housing.

The principal reason for focusing on housing starts, rather than completions, as the measure of newly constructed housing units is that causality is seen as predominantly running from household formation to housing construction. Thus, the use of starts is appropriate simply because they precede completions and hence occur closer in time to the demographic stimulus.[6] Furthermore, data on completions are available only

5. When the data are adjusted for shifts in the age composition, the ratio of the mean absolute deviation in the overall incremental headship rate to that of the level headship rate rises from 3:1 to over 5:1.

6. The average start-to-completion lag is about 6 months for single-family structures and just over 9 months for multifamily structures; as single-family starts account for roughly two-thirds of total starts, on average, the weighted average for all units is about 7 months. In addition, there is a lag between demand signals and the initiation of housing construction; as a result, it is appropriate, using 5-year averages, to relate housing starts during 1961–65 to household formation from mid-1960 to mid-1965, and so forth.

since 1968. Finally, national income and product account estimates of investment in new single-family residential structures (discussed later in the article) are based on starts.

With the above considerations in mind, the housing demand/supply relationship may be written as

$$(1) \quad \Delta HH_t + \Delta VAC_t = HS_{t-\theta} + MHP_t + CONV_t - REM_t$$

where ΔHH is the net change in the number of households; ΔVAC, the change in the number of vacancies; HS, housing starts (the average start-to-completion lag is θ); MHP, mobile home placements; $CONV$, net conversions; and REM, removals (demolitions). Data on mobile home placements are available only since 1974, but data on shipments of mobile homes (units), which are available throughout, closely correspond with data on placements.

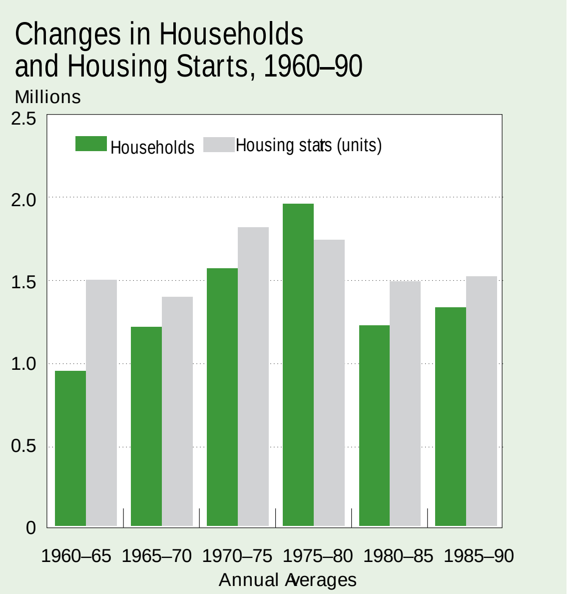
Annual data on mobile home shipments show considerable variability. Over the period 1961–90, they ranged from 80,000 to 576,000 units annually, but were generally between 200,000 and 300,000 units. On average, they numbered about 18 percent of total private housing starts, but in the late 1960's and early 1970's, this proportion reached as high as 28 percent. However, because mobile homes have much shorter lifespans (on average about 10 years) than those of stationary structures, a substantial proportion of newly available units satisfies replacement demand. Moreover, some mobile homes are used as second (recreational) homes or as transitional housing. Finally, some mobile homes are used for nonresidential purposes. For these reasons, it seems appropriate to exclude mobile homes from the basic demographic demand/supply relationship.

Data on demolitions and conversions are limited and incomplete. Census Bureau data on housing units authorized for demolition for 1974 through 1979 show a steady decline from about 140,000 units to about 100,000 units per year; in general, demolitions were well below 10 percent of private housing starts.[7] Unpublished Census Bureau data for 1980–92 show substantially lower levels of demolitions. Economic factors, as well as the degree of physical deterioration, may affect the rate of removals, but the available data do not indicate that variations are clearly associated with aggregate economic activity. Finally, a supplement to the 1980 Census of Housing shows that conversions from nonresidential to residential use is quantitatively insignificant relative to new home construction: In 1980, the conversions added fewer than 8,000 housing units. Figures on subdivisions and consolidations are not available, but most likely, their net contribution is also small. Thus, the roles of demolitions and conversions can generally be ignored.

The analytically important part of equation (1), accordingly, devolves to the relationship among net household formation, housing starts, and the change in vacancies. Vacancies account for the difference between housing units demanded (based on the number of households) and housing supply (the stock of available housing units). Because of the mobility of households—in terms of location and among types and sizes of residential structures—and because second homes are counted as vacant units, some ratio of vacancies, quite possibly varying over time, represents a "normal," or equilibrium, level; variations in actual vacancies around this level are associated with cyclical and irregular variations in residential construction.

Chart 3 shows the net changes in households and housing starts by half-decades. The relationship between them is distinctly more variable than that between changes in adult population

CHART 3



Note–Housing starts are measured over 1961–65, 1966–70, etc. See text for more information.
Data: Bureau of the Census

U.S. Department of Commerce, Bureau of Economic Analysis

7. U.S. Department of Commerce, Bureau of the Census *Construction Reports* C-45 (various issues). The figures given include publicly owned buildings.

and changes in the number of households. Net changes in households and housing starts move in opposite directions twice—from the first half to the second half of the 1960's and from the first half to the second half of the 1970's. However, an underlying relationship can be seen when full decades are examined: Both net household formation and levels of housing starts were relatively high in the 1970's, compared with those in the 1960's and 1980's.

For most of the three decades—the late 1970's are the exception—the number of housing starts exceeded the net increase in households. During four of the six half-decades—1965–70, 1970–75, 1980–85, and 1985–90—the excess was within a fairly narrow range, 14 percent to 22 percent, and averaged 17 percent. A moderate excess is to be expected because some new housing units represent replacements of removed units and because of purchases of second homes. Beyond the replacement level, the excess of new units constructed, including those intended for use as second homes, plus net conversions over the net increase in households adds vacancies.

During two of the half-decades, 1960–65 and 1975–80, the ratio of starts to net household formation departed substantially from its usual range. During 1960–65, starts exceeded net household formation by 59 percent. The cause (or source) of the (measured) excess is not readily apparent. Calculations made by Patrick H. Hendershott and Marc T. Smith indicate that a rise in vacancies contributed only modestly (about 12 percent of estimated completions) to this excess; accordingly, they infer, by computing residuals from an identity similar to equation (1), that there were exceptionally large negative "net other additions" (essentially the sum of the right-hand-side components in equation (1) excluding housing starts), which suggests an unusually large number of removals.[8] Continued recovery from mortgage credit restraint in the late 1950's may also have contributed modestly, but analyses of residential construction and the mortgage market at the time do not emphasize this aspect.

In the late 1970's, in contrast, housing starts fell short of net household formation by 11 percent. This shortfall reflected a very rapid pace of net household formation—the most rapid during 1960–90—combined with the restraining effect of credit rationing on the financing of residential construction.[9] Declines in both rental and homeowner vacancy rates during the late 1970's are consistent with the relative changes in the number of households and of newly constructed housing units.

Composition of housing starts by type of structure

The type of housing that a household selects as its primary dwelling depends upon such factors as income, marital status, family size, and recency and permanence of establishment in the community. The basic choice in terms of types of structure is among a detached single-family home, a unit in a duplex or multiplex structure, an apartment, or a mobile home. Another choice involves tenure, that is, whether to rent or buy the property. These two choices are linked in two senses. First, certain factors, such as income and recency and permanence of establishment, underlie both decisions. Second, units in multifamily structures are typically rental units, while single-family homes are typically owner-occupied units.

It is certainly plausible that a household residing in a rental apartment will time its purchase of a single-family home on the basis of current and expected economic and financial circumstances. However, because both tenure choices are available for all types of structures, the assumption that underlies the following analysis is that these decisions are, at least in the long run, independent.[10] Thus, the composition of the (occupied stationary) housing stock by type of structure—specifically, the relative numbers of units in single-family and multifamily structures—must reflect the mix of circumstances among households that determine the choice of housing. These circumstances (factors) are all more or less related to the age of the householder, that is, his or her stage in the life cycle. Accordingly, the single-family/multifamily composition should be strongly correlated with the age composition of heads of households.

8. "Housing Inventory Change and the Role of Existing Structures, 1961–1985," *American Real Estate and Urban Economics Association Journal* 16, no. 4 (1988): 364–78.

9. Credit rationing resulted from the imposition of interest rate ceilings under the Federal Reserve Board's Regulation Q. These ceilings, in the face of strong upward pressure on interest rates, severely restricted mortgage lending by banks and savings and loan associations. The ceilings were phased out during the early 1980's under the Banking Act of 1980.

10. One analyst has developed a sequential model in which homeownership is made a function of the ratio of the real user cost of owner-occupied housing to the rental price index, credit variables, and real disposable personal income per capita, and then housing starts in 1-to-4-family-unit structures are depicted as depending largely on homeownership. See Patrick H. Hendershott, "Real User Costs and the Demand for Single-Family Housing," *Brookings Papers on Economic Activity*, no. 2 (Washington, DC: Brookings Institution, 1980): 401–44. For the reason given, however, this is not viewed as appropriate for long-run analysis.

The implication of this correlation for new residential construction is that insofar as the composition of the initial housing stock by type of structure is in equilibrium with respect to the demands of households, the composition of newly constructed units should be similarly related to the age distribution of (net) newly formed households. More specifically, allowing for initial departures from equilibrium vacancy levels, the proportions of housing units started in single-family and in multifamily structures should accord with the propensities of (net) new households to inhabit such structures.

Such (aggregate) propensities can be roughly quantified from data on the age composition of net changes in households and cross-tabulations of (levels of) households by age of householder and type of structure. The change-in-households data is shown in table 1. The required cross-tabulations were obtained from the 1980 Census of Housing. Unfortunately, this is the only such tabulation for the 30-year period under review.[11]

It is reasonable to suppose that the relative propensities of householders within each age group to inhabit single-family or multifamily structures vary somewhat over time because of changes in underlying economic, demographic, and social conditions. However, if these within-group variations are small relative to the variations across age subgroups over time, one may, for approximate analytical purposes, treat the age-group proportions as if they were stable. Estimates of aggregate proportions of (net) changes in households that are expected to occupy single-family structures can then be derived as weighted averages of the subgroup propensities.

The proportions of households occupying single-family structures (excluding mobile homes) by age subgroup derived from the 1980 housing census are shown in the following tabulation:

Age subgroup	Percent of total households in single-family structures
18 to 24 years	36.8
25 to 34 years	62.6
35 to 64 years	78.5
65 years and older	69.5

11. U.S. Department of Commerce, Bureau of the Census, *1980 Census of Housing* (Washington, DC: U.S. Government Printing Office, November 1983): Table A–8. The desired proportions are calculated by summing, by age group, over ownership status and household type (married couple families and unmarried householders). Earlier housing censuses do not provide complete age breakdowns, and the more frequent household surveys contain cross-tabulations of households by age group of householder and tenure status, but not by type of structure.

The variation across age groups is seen to be quite wide.

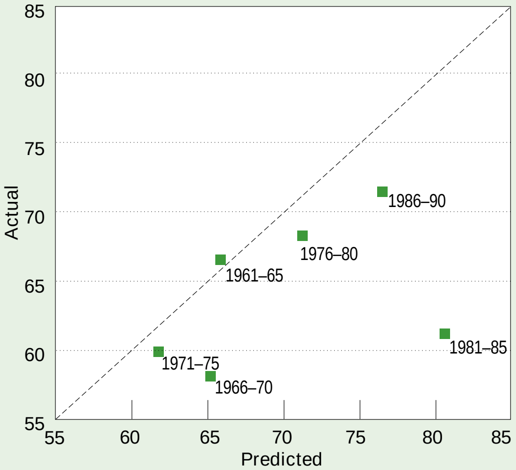
For each 5-year period, the proportion of the (average annual) net change in all households that is estimated to reside (or be predisposed to reside) in single-family structures ("single-family households")—and hence the presumptive, or "predicted," proportion of single-family starts (disregarding differences in replacement rates for the two types of structures)—is then calculated by multiplying the average net change in households in each age group by the corresponding percentage from the above tabulation, summing these products over age subgroups, and dividing the sum by the aggregate net change.[12] If initial vacancy rates for each type of structure are in equilibrium (or are not disproportionately in disequilibrium) and if the estimated proportions of single-family households in overall net household formation are reliable for the period in question, then the predicted proportions of total housing units started in single-family structures would be equal to the actual single-family household proportions.

How, in fact, do the predicted and actual proportions of single-family starts for the six 5-year periods compare? Chart 4 reveals the degree of correspondence. The predicted percentages are

12. The overall proportions are relatively insensitive to moderate changes in the underlying proportions that are taken as unvarying parameters for purposes of this analysis.

CHART 4

Percent of Housing Starts in Single-Family Structures: Actual versus Predicted, 1961–90



Data: Bureau of the Census and Bureau of Economic Analysis

U.S. Department of Commerce, Bureau of Economic Analysis measured on the X-axis, and the actual percentages, on the Y-axis; the points on the diagram represent pairings of the predicted and actual percentages for the six time periods. If the predicted proportions equalled the actual proportions, all the points would lie on the diagonal line.

Given the restrictive assumptions that underlie perfect predictions, four of the six points—for 1961–65, 1971–75, 1976–80, and 1986–90—are remarkably close to the diagonal line; for these periods, the differences between the predicted and actual proportions (distances from the diagonal line) are less than 5 percentage points. In 1966–70, the actual proportion of single-family starts was 7.5 percentage points below the predicted proportion. (There is no apparent reason, such as differences in initial vacancy rates, for this greater spread.) In 1981–85, however, the actual proportion of single-family starts was, at 62.6 percent, 17.6 percentage points below the predicted proportion of 80.2 percent. The predicted proportion is high for that period because of the decline in households headed by young (18-to-24-year-old) adults, who tend to inhabit multifamily structures.

The distortion in the composition of housing starts in 1981–85 is clearly beyond the bounds of probable estimation error and possible oversimplification of the assumptions and calls for an explanation. It appears, to begin with, to predominantly reflect an overbuilding of multifamily structures relative to demographic requirements. The overbuilding is evidenced by the fact that starts in multifamily structures averaged about 10 percent more in 1981–85 than in 1976–80 despite decreases in the numbers of young adults and by a rise in the rental vacancy rate from 5.1 percent in 1981 to 7.7 percent in 1987. Single-family housing starts, in contrast, declined by about the estimated reduction in net formation of single-family households. The causes of the overbuilding of multifamily structures are well known. The combination of newly legislated accelerated tax depreciation and deregulation of banks and of savings and loan institutions, which increased their lending flexibility, encouraged multifamily-type construction on a large scale.

In 1986–90, the actual proportions of single-family and multifamily starts reverted nearly to their predicted levels as the former increased and the latter decreased sharply despite a slight net increase in multifamily households. However, against the background of excessive multifamily unit construction in the first half of the decade and continued high vacancy rates, the change in composition of starts does not represent a full restoration of equilibrium: In light of demographic requirements, multifamily unit construction remained high until the end of the decade.

Real investment per new housing unit

This section discusses long-run changes in real investment per new housing unit. For new single-family structures, the long-run trend in constant-dollar investment per unit (with units measured by housing starts) has been positive over the three decades despite a decrease in average household size; the average annual rate of increase for 1960–90 was about 2 percent, with the largest increases in early 1960's and the late 1980's.

Most purchases of single-family residential structures are made for owner occupancy, and owner-occupants hold such property first and foremost for the housing services it provides. The "amount"—that is, the size, quality, and location—of house value purchased depends on economic factors as well as on size of the household. These economic factors—in particular, prices of available housing of given qualitative characteristics, household income, accumulated saving, and available mortgage borrowing terms—may be summarized by the term "affordability."

Residential real estate, whether purchased for owner occupancy or leasing, is also widely recognized and held as an investment vehicle. Accordingly, at least some buyers of homes for their own use will also consider expected resale value in relation to the cost of ownership.

To evaluate the relative roles of changes in affordability and in the expected investment return, two measures, each embodying one of these concepts, are used—an "affordability" index and a measure of the "user cost" of housing capital.

Affordability Index.—The National Association of Realtors (NAR) compiles a housing Affordability Index, which combines data on mortgage loan terms, household income, and house prices. Specifically, the Affordability Index expresses median household income as a percentage of the income level required to qualify for a mortgage loan to purchase the median-priced existing house.[13] Thus, if median family income is just

13. The Affordability Index assumes that the required downpayment is 20 percent of the purchase price and that the mortgage is a fixed-rate mortgage with a 30-year term (the term most frequently encountered). For purposes

enough to qualify for a mortgage loan, the Affordability Index is 100 percent; higher or lower levels of median income accordingly generate index levels above or below 100.

User cost of housing capital.—There are several shortcomings to the NAR Affordability Index as a behavioral indicator for home buying intentions, the most prominent being its exclusion of the return to housing as an investment. Thus, as an alternative measure, the user cost of housing capital is considered. User cost, a concept first introduced into the theory of nonresidential fixed investment, is "the implicit rental value of capital services supplied by a firm (in the present context, a home owner) to itself."[14] The generic user cost expression is formulated as

$$c = p(r + \delta) - \dot{p}, \tag{2}$$

where c is user cost, p is the capital goods price, $\dot{p}$ is its expected rate of change, r is the (nominal) interest rate (adjusted for tax deductions), and δ is the depreciation rate. The selection of specific appropriate variables for constructing an empirical measure of user cost, especially the tax-adjusted interest rate and the depreciation rate, is a difficult and often controversial matter. Indeed, with respect to housing, different measures may be appropriate to the issue of tenure choice and for analyzing real investment per new housing unit.[15]

For present purposes, a user cost measure developed by Laurence H. Meyer and Associates for the residential construction sector of its quarterly econometric model is used. The specific form of the user cost expression in that model is

$$\text{User cost} = (PRC/PCON)*[RMTG*(1 - 0.008*UTW) + (1 - 0.01*UTW)*UTSIBP - WXPRC + 2.982], \tag{3}$$

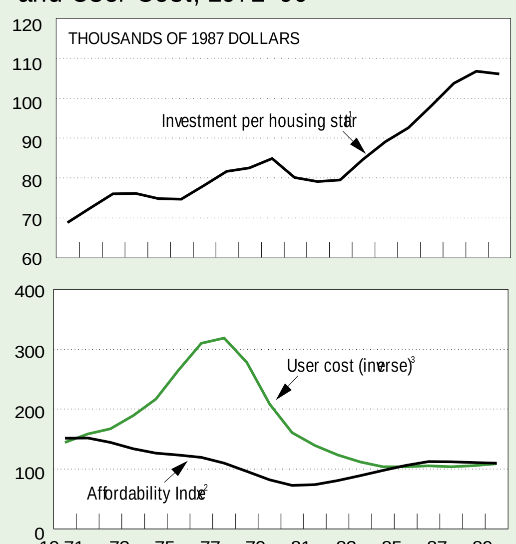
where PRC is the implicit price deflator for residential investment, $PCON$ is the implicit price deflator for personal consumption expenditures, $RMTG$ is the fixed commitment rate on 30-year conventional mortgages, UTW is an economy-wide income-weighted average of marginal tax rates (Federal plus State and local) on wage income, $UTSIBP$ is the (average) property tax rate (computed from property taxes in the national income and product accounts and from BEA's estimate of the nominal residential housing stock), $WXPRC$ is the "expected" rate of change (measured as an annualized 20-quarter moving average of actual change) in PRC, and the constant 2.982 is the average depreciation rate (estimated from BEA's stocks and flows of residential investment). The critical difference between the affordability and user cost measures is the inclusion of the expected rate of change in new house prices in the user cost measure.

Real investment per housing start, the Affordability Index, and user cost are shown in chart 5 for 1971–90, the period for which all three series are available. Here, centered 3-year moving averages of the data are used instead of simple 5-year averages. The inverse of the user cost (more precisely, 1000/user cost) is used for easier comparison with the Affordability Index.

Several observations stand out. First, although the Affordability Index was at exceptionally high levels in the early 1970's (it averaged 146 in 1971–75), investment per new housing unit was

CHART 5

Real Investment per Single-Family Housing Start, Affordability, and User Cost, 1971–90



1. Data: Bureau of Economic Analysis and Bureau of the Census.
2. Data: National Association of Realtors.
3. Data: Laurence H. Meyer & Associates.

U.S. Department of Commerce, Bureau of Economic Analysis

of analyzing new residential construction, use of the median price of new, rather than of existing, houses is preferable; however, the two time series (compiled by the Census Bureau) are quite strongly correlated.

14. Dale W. Jorgenson, "The Theory of Investment Behavior," *Determinants of Investment Behavior*, ed. Robert Ferber (New York: National Bureau of Economic Research, 1967): 129–35.

15. See Patrick H. Hendershott and Joel Slemrod, "Taxes and the User Cost of Capital for Owner-Occupied Housing," *American Real Estate and Urban Economics Association Journal*, no. 10 (1983): 375–92.

not exceptionally large during this period (it was generally below the levels of the late 1960's). At least a partial solution to this puzzle can be found in the fact that during this period, the earliest baby boomers were the principal source of demand for new single-family homes. Because the average income of this relatively young population subgroup was, in all likelihood, well below the median for the adult population, the use of median income in the Affordability Index substantially misrepresented affordability of homeownership for this part of the population.

Investment per unit increased moderately during the late 1970's, while both the Affordability Index and the user cost declined. The movement in investment per housing unit was thus consistent with that in user cost and inconsistent with that in "affordability." The divergent movements in affordability and user cost were largely accounted for by accelerating inflation in the overall price level and in new home prices in particular and, accordingly, in inflationary expectations; from 1971 to 1978, the mortgage rate rose 2.1 percentage points, while the expected inflation rate increased 4.8 percentage points. Apparently, during this period, the shift towards more expensive home purchases reflects dominance of the investment motive. This rising trend was sharply reversed during the early 1980's.

After 1983, investment per unit again rose sharply, but this time, its rise paralleled rises in the Affordability Index. User cost, after rising sharply in 1984, remained fairly level thereafter. Certainly in part, the renewed surge to more expensive home purchases reflected the movement of the baby boom generation into higher income brackets as they matured into their middle years. However, this may have been mitigated by a weakening of the investment motive for home purchases as inflation decelerated in tandem with declining nominal mortgage rates.

Real investment per unit in multifamily structures has been considerably more erratic through time than that in single-family structures. There was only a slight positive trend over the three decades: The increase in real investment was about 0.6 percent annually or roughly one-third that in single-family structures. The year-to-year fluctuations doubtless reflected changes in the composition of particular types of structures built and interregional shifts in the concentration of such structures. For the three decades, the average real investment per unit in multifamily structures (1987 prices) was $50,700, compared with $80,100 for single-family structures.

Improvements versus trading up

Over 1960–90, increasing amounts—and, indeed, a growing proportion of total investment in residential structures—were expended on existing, rather than on new, structures. Real expenditures for improvements—additions, alterations, and major replacements—increased at an average annual rate of 1.8 percent from 1960 to 1990; from the early 1960's to the late 1980's, they rose from an average share of 22.1 percent of total purchases of structures (in 1987 dollars) to 25.8 percent.

Major replacements are, of course, normally made in response to natural wear and tear or to physical damage. In contrast, additions and alterations, which account for the bulk of improvements, reflect voluntary decisions to upgrade houses or to restructure them for personal convenience and often represent alternatives to moving.

A household in a single-family home that has decided that it must have, or simply desires to have, larger or otherwise improved living quarters may fulfill this need or desire by moving—that is, "trading up"—to another house or by enlarging or otherwise structurally modifying its present home. Many factors, including such noneconomic issues as location and the degree of attachment to the present home or neighborhood, impinge upon this decision. A major consideration is, of course, the relative costs—including borrowing, transactions, and moving costs.

It is difficult to assess the impact that changing relative costs of restructuring existing houses and of trading up has had on the aggregate level of improvements—in particular, additions and alterations—and its share of total investment in residential structures. Higher prices of existing and new homes do not furnish a meaningful indicator, because presumptions cannot be made about the relative movements of prices of houses being sold and purchased by moving households. However, real transactions costs have clearly risen, and their rise at least partly accounts for the relative increase in expenditures for additions and alterations.

Table 2 shows, by half-decades, the ratio of real expenditures for additions and alterations to purchases of new single-family structures and the ratio of the implicit price deflator for brokers' commissions to the implicit price deflator for personal consumption expenditures. The price ratio, which provides an indication of relative transactions costs, had already begun to rise

Table 2.—Proportion of Real Additions and Alterations to Purchases of Single Family and the Real Transaction Cost of Home Sales, 1961—90

	1961–65	1966–70	1971–75	1976–80	1981–85	1986–90
Ratio of additions and alterations to purchases of single family structures	0.32	0.33	0.28	0.32	0.38	0.35
Ratio of implicit price deflator for brokers' commissions to implicit price delator for personal consumption expenditure	.73	.73	.79	.89	.91	.99

sharply in the 1970's; however, a marked increase in the proportion of additions is only seen in the 1980's. The seemingly long lag in the response may simply reflect the fact that during the late 1970's, a large number of new housing units was required to accommodate the rapid increase in the number of households; additions and alterations do not serve this need. Note also that increasing expenditures for additions and alterations, like investment in new structures, can reflect increases in numbers of units or increases in expenditures per unit or both; data are not available to sort out the difference.

Total investment in residential structures

From 1960 to 1988, real investment in residential structures increased at an average annual rate of 2.5 percent, somewhat slower than the 3.2-percent average rate of growth of real gross domestic product.[16] Thus, the average share of such investment in real GDP fell from 5.5 percent to 4.5 percent.

The rate of change has varied substantially over time. On an annual basis, variations have been very sharp and declines have occurred in 14 of the 30 years from 1960 to 1990. These variations reflect the strong sensitivity of residential construction to economic and credit conditions. In terms of 5-year averages, the variations are much smaller: The average deviation of the growth rate from its mean (without regard to sign) is 2.4 percentage points, compared with 11.5 percentage points on an annual basis.

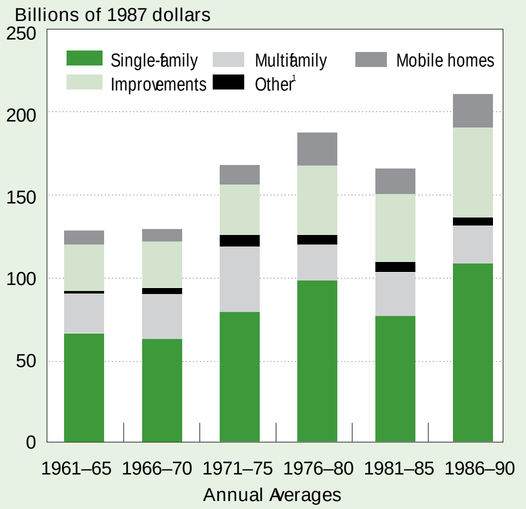
Half-decade averages of total real purchases of residential structures and of its major components are shown in chart 6. Purchases increased sharply from the late 1960's to the early 1970's; a further (smaller) increase occurred in the late 1970's. The higher levels of purchases reflected primarily the larger numbers of new housing units constructed; the latter, in turn, is associated with the bulge in net household formation triggered by the postwar baby boom. The lower levels of housing investment in the early 1980's reflect the decline in building of new single-family structures; these reductions stem from lower rates of increase in households headed by persons in the age groups inclined to inhabit such structures, as well as from the sharply reduced incremental headship rates that were associated with recession and tight credit conditions. Larger investments in both new multifamily structures and improvements partly offset the decline in investments in single-family structures.

Real investment in structures was again sharply higher in the late 1980's, compared with that in the first half of the decade. The number of new housing units built was only slightly larger; however, the real value per unit of new single-family structures was substantially greater. Further, there was proportionately more investment in improvements.

The generally expanding levels of the "other" component, which is dominated by brokers' commissions on sales of existing and new houses, reflects increased numbers of single-family units sold as well as higher average values of the existing properties that were sold.

CHART 6

Real Purchases of Residential Structures, Major Components, 1961–90



1. Other structures (dormitories, etc.), brokers' commissions, and net purchases of used structures.
Data: Bureau of Economic Analysis

U.S. Department of Commerce, Bureau of Economic Analysis

16. The year 1988 is taken as the endpoint because the cyclical decline in residential investment to 1990 distorts the underlying growth trend.

Housing construction in the 1990's

Real investment in residential structures decreased steadily from 1987 to 1991, when housing starts fell to a historic low of 1.01 million units. These declines resulted from the combined effects of decelerating household formation, a sharp slowdown in multifamily unit construction due to the continued overhang of vacancies from the early 1980's, and the recession of 1990–91. By mid-1991, the decline in housing starts began to be reversed. In the first 5 months of 1994, starts averaged 1.42 million units (annual rate).

On the basis of the Census Bureau's projections of adult population and BEA's estimates of real investment in residential structures for 1991–93, some inferences can be drawn about the likely behavior of residential construction during the rest of the 1990's.

First, based on Census Bureau projections of population by age subgroups to 1995 and 2000 and on the application of incremental headship rates near the recent averages, overall projections of net household formation can be made.[17] The projected net increases in households (at average annual rates) are 1.11 million for 1990–95 and 1.04 million for 1995–2000. These rates represent a substantial deceleration from those in the late 1980's and, indeed, are the lowest rates since the early 1960's; however, the (implied) aggregate incremental headship rates are relatively high at 58 percent in 1990–95 and 54 percent in 1995–2000. Declines in the number of young adults (18- to 24-year-olds) and of households headed by them continue through both halves of the 1990's; by the late 1990's, declines spread to the 25- to 34-year-olds.

Applying the average ratio of housing starts to net household formation from the nonextreme half-decades from 1960 to 1990 (1.17) to the projected net increases in households yields an average annual rate of 1.37 million housing starts for 1991–95 and an average rate of 1.32 million units for 1996–2000. However, housing starts averaged only 1.17 million units during 1991–93; thus to reach the projected 1.37 million units, they would have to average 1.68 million units for 1994–95, a rate that is well beyond the range of those seen in current forecasts. Because of continued high initial vacancy rates, especially for rental units, such a high ("makeup") level should not be expected; thus, consensus forecasts of about 1.4 million starts in 1994 and in 1995 are quite plausible and imply an average level of about 1.26 million starts for 1991–95. The average number of starts projected—purely on demographic considerations—for 1996–2000 thus represents a slight increase from the projected 1991–95 level. Because of the projected declines in the number of households in the younger age groups, the proportions of starts of units in multifamily structures (using the methodology described earlier) can be expected to remain low—on the order of 20 percent of total starts.

17. More specifically, the incremental headship rate used for each subgroup is either the level rate for 1990 or a rate between the level rate and the 1985–90 incremental rate.